

The following papers were read :—

1. The Mammals of the Solomon Islands, based on the Collections made by Mr. C. M. Woodford during his Second Expedition to the Archipelago. By OLDFIELD THOMAS, Natural History Museum.

[Received July 25, 1888.]

(Plates XX.—XXII.)

In the Proceedings of the Society for last year<sup>1</sup> I had the pleasure of describing a collection of Bats which Mr. C. M. Woodford had formed at Shortland and Fauro Islands, at the western end of the Solomon Archipelago, and the present paper gives an account of a second collection made by the same gentleman in the eastern islands of the group. This second collection is larger and more important than the first, for, apart from the considerable number of duplicates, the set acquired by the British Museum consists of 42 specimens belonging to 19 species. Two species only of the ten previously found are not represented in it, and by the inclusion of these and of a Rat described by Mr. E. P. Ramsay from Florida Island, the present paper is made a complete list of the Mammals known to occur in the group.

Of the specimens now described a few were collected at Rubiana, New Georgia, but the great mass of them, and all the new species, were obtained at Aola, on the north-east coast of Guadalcanar, where Mr. Woodford resided for several months<sup>2</sup>.

The total number of mammals now known from the Solomons is brought up by the present collection from 13 to 22, and of these no less than 8 have been discovered by Mr. Woodford, the previous collection having contained 2 and the present one 6 new species. There are also two new genera of Bats to add to the one previously described.

All the specimens are beautifully preserved in spirit, and Mr. Woodford is to be congratulated on the fact that the care and trouble he must have expended on the collection have been rewarded by the addition of so large a number of new and interesting species to the Mammalian fauna of the Australian region.

#### CHIROPTERA.

1. PTEROPUS GRANDIS, Thos.

*Pteropus grandis*, Thos. P. Z. S. 1887, p. 320, pl. xxv.

a. ♂. Rubiana, New Georgia.

Forearm 163 millim.

This fine species was one of Mr. Woodford's previous discoveries, the original specimens having been obtained by him at Alu,

<sup>1</sup> P. Z. S. 1887, p. 320.

<sup>2</sup> Mr. Woodford has given an account of his wanderings and personal experiences in the Solomon Islands in Proc. R. Geogr. Soc. 1888, p. 351.



1.



2.

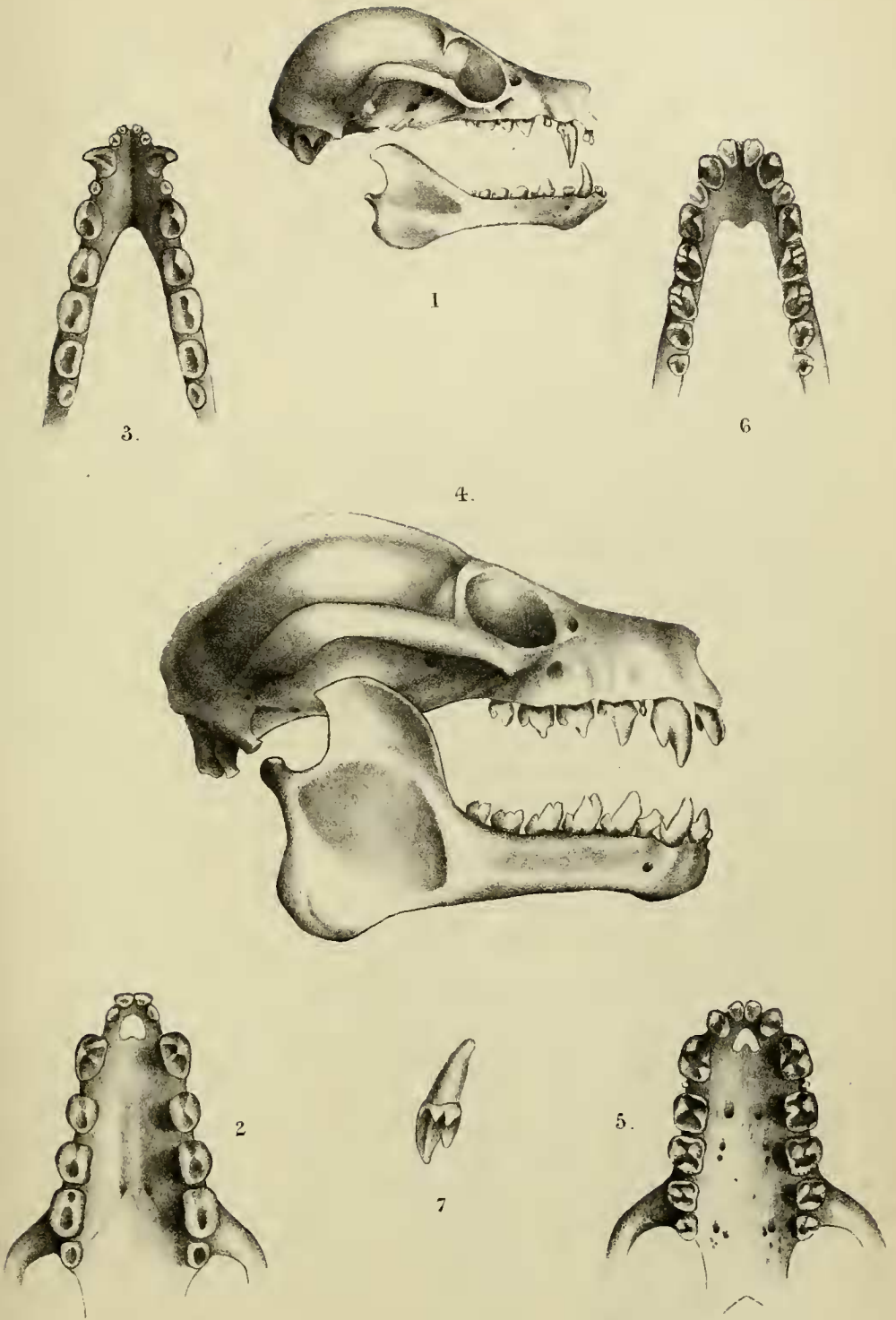


3.

J. Smit del. et lith.

Mintern Bros. imp.

- 1 PTEROPUS WOODFORDI
- 2 PTEROPUS CORONATUS.
- 3 PTERALOPEX ATRATA.

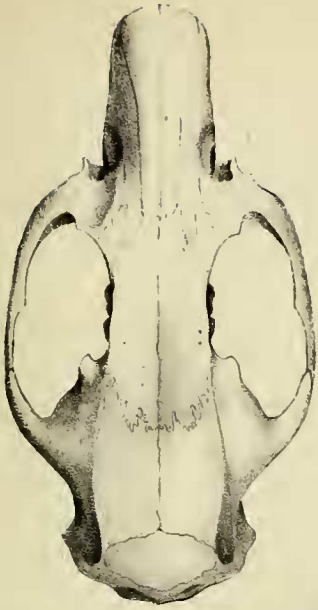


M. H. Fisher del et lith.

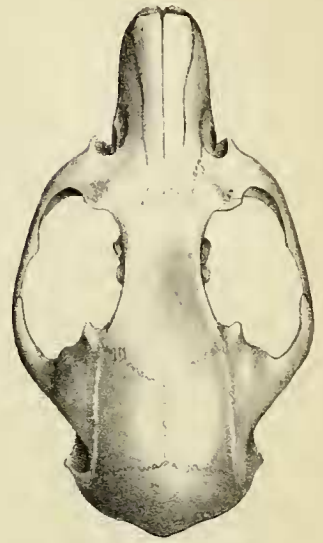
Mirthern Bros. imp.

1. PTEROPUS WOODFORDI. 2, 3 PTEROPUS CORONATUS.

4-7. PTERALOPEX ATRATA.

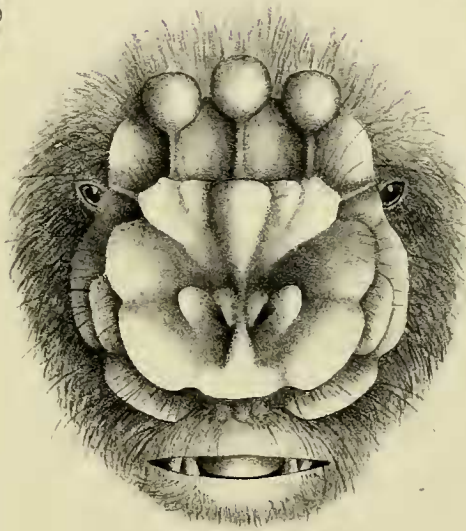


2.



4.

$\frac{4}{1}$



1.



3.



6.



5.

M. H. Fisher del. et lith.

Mintern Bros. imp.

1. LANTHOPS ORNATUS 2,3 MUS IMPERATOR.  
4,5. M. REX. 6. M PRÆTOR.



Shortland Island. The present individual agrees in every respect with the type.

## 2. PTEROPUS<sup>1</sup> HYPOMELANUS, Temm.

No further specimens of this species were obtained, and Shortland Island remains therefore its only known locality within the group.

<sup>1</sup> The following new species of *Pteropus* from the Duke of York Archipelago may also be conveniently described here:—

*PTEROPUS CORONATUS*, sp. n. (Plate XX. fig. 2, Plate XXI. figs. 2, 3.)

Ears of medium length, naked, projecting much beyond the rather short fur; their anterior edges far less convex than their posterior, their tips bluntly pointed. Wings arising on the back only about half an inch apart. Inter-femoral membrane narrow, concealed in the centre by the fur.

Whole of head and neck very pale buff, nearly white on the crown between the ears and above the eyes. Face ornamented with a prominent brown T-shaped mark, of which the cross-line runs transversely across the forehead halfway between the eye and ear, and the upright runs down the centre of the face between the prominent white supraorbital patches, and extends forwards about one third of an inch in front of the anterior canthus of the eye. Eyelids and muzzle nearly naked, brown. Cheeks and chin dark blackish brown. Front of neck, chest, and centre of belly very pale brown, scarcely darker than the nape. Sides of belly and pubic region darker brown. Posterior back blackish brown, mixed with dull yellowish; the fur closely adpressed, and only about one inch broad at the narrowest part. Fore limbs and membranes nearly naked above, a few hairs only extending along the upper side of the humerus and forearm; upper and posterior sides of the thighs thickly furry; lower leg naked. Below the fur covers the antebrachial membrane, the humerus, femur, and the wing-membrane internal to them, and also passes along the outer side of the forearms in a band about one inch wide.

*Teeth* (Plate XXI. figs. 2, 3) unusually strong and heavy, smoothly rounded, without basal cusps. Canines very long and sharp, their basal ledges obsolete. Anterior upper premolar very minute, but still persistent in the type. Other premolars very short horizontally, their breadth almost equal to their length. Last molars, both above and below, comparatively large, above about one fourth and below about one third of the penultimate molars. Anterior lower premolar about half the size of the last molar, separated from the canine and next premolar by diastemata each about equal to its own diameter.

Dimensions of the type, an adult male in spirit:—Head and body 243 millim.; head 77; tip of muzzle to eye 29; ear 24×16; forearm 167 (=6·6 in.); thumb without claw 66; lower leg 76; calcaneum 26; foot 56·5.

*Skull*:—Basal length 69; greatest breadth 38·3; interorbital breadth 9·9; palate, length 43, breadth outside m.<sup>2</sup> 21·3, inside m.<sup>2</sup> 12·5; basi-cranial axis 22·2; basi-facial axis 49.

*Teeth*:—Combined breadth of upper incisors 7·7; vertical length of upper canine, from cingulum to tip behind 10·6; horizontal length of large anterior premolar 5·0, of posterior premolar 5·0, of first molar 6·5, of second molar 3·8.

*Hab.* Mioko Island, Duke of York group (*Dr. O. Finsch*), 13/3/85.

This very handsome species has a certain superficial resemblance to *Pt. ocellaris* Peters\*, of which I have examined the type, an old male, in the Berlin Museum. That animal, however, is distinguished by having a forearm only 137 millim. long, by its much smaller teeth †, and by many detailed differences in coloration, among which may be specially mentioned its wholly black underside, the black extending all over the front of the neck.

\* MB. Ak. Berl. 1867, p. 326.

† Combined breadth of four upper incisors 5·7 millim.; length of upper canine 6·9, of last upper premolar 3·6.

## 3. PTEROPUS RAYNERI, Gray.

*a-c.* 2 ♂, 1 ♀. Aola, Guadalcanar. [2<sup>1</sup>.]  
Forearms 138, 132, and 120 millim.

## 4. PTEROPUS WOODFORDI, Thos. (Plate XX. fig. 1, Plate XXI. fig. 1.)

*Pteropus woodfordi*, Thos. Ann. Mag. N. H. (6) i. p. 156 (1888).

*a-d.* 2 ♂ and 2 ♀. Aola. [3.]

Size small. Fur soft and woolly, not adpressed on the back. Ears small, hairy, scarcely projecting beyond the fur of the head. Wings arising about half an inch apart on the back; the fur rather more than an inch wide on this part. Hind limbs below knees entirely naked. Interfemoral membrane narrow, almost obsolete in the centre, concealed by the fur. Face and chin brown or black, becoming in old specimens quite grey. Collar dull rufous or yellow, markedly different in colour both from the head and back. Tufts on shoulder-glands deep orange, not dissimilar in colour to the rest of the neck. Back and belly deep brown, mixed with a few shining grey hairs, which markedly increase in number in old age.

Skull (Plate XXI. fig. 1) as in *Pt. molossinus*.

Teeth small and light; canines long and slender. Upper anterior premolar persistent, about equal in cross section both to the last lower molars, outer lower and all the upper incisors. Last upper molar and anterior lower premolar about equal, and double the size of the last-named set of teeth;  $\overline{p}^3$  with an antero-internal basal cusp.

Dimensions of a male and female, the first being the type, a very old specimen with a grey head and back:—

	♂ millim.	♀ millim.
Head and body . . . . .	(c.) 150	(c.) 145
Muzzle to eye . . . . .	16	16
Ear . . . . .	11.5	11.5
Forearm . . . . .	99	98
Thumb . . . . .	34	33
Lower leg . . . . .	48	46
Depth of interfemoral behind knee	15	13

Forearms of two additional specimens, ♂ 96; ♀ 92.

Skull, ♀:—Basal length 36; greatest breadth 24.2; supraorbital foramen to tip of nasals 17.8; interorbital breadth 6.6; intertemporal breadth 9; palate, length 20.6. Teeth:—Combined breadth of upper incisors 4.1; vertical length of canine, from cingulum to tip behind 4.6; greatest antero-posterior diameter of canine 2.4; horizontal length of  $\overline{p}^3$  2.5, of  $\overline{p}^4$  2.2, of  $\overline{m}^1$  2.5. Height of lower canine 3.4; horizontal length of  $\overline{p}^3$  2.8; of  $\overline{p}^4$  2.3.

This species is most nearly allied to *Pt. molossinus*, Temm., of the Caroline Islands, with which, alone among the smaller woolly-haired

<sup>1</sup> The figures placed in brackets show the number of specimens obtained by Mr. Woodford additional to those retained for the Museum series, these latter being represented by the letters *a*, *b*, *c*, &c.

members of the genus, it agrees in the entire nakedness of the upper surface of its legs. From that animal, however, it is readily distinguishable by having a bright-coloured collar, by its hairier and less sharply pointed ears, and by its much more delicate teeth, the canine especially being far slenderer and lighter.

#### PTERALOPEX, Thos.

*Pteralopex*, Thos. Ann. Mag. N. H. (6) i. p. 155 (1888).

External characters as in *Pteropus*. Ears short, hairy. Wings arising from the centre line of the back.

*Skull* (Plate XXI. fig. 4) with a peculiarly short muzzle and flattened frontal region; planes of the orbits much more nearly parallel to each other, and directed more upwards and less forwards, than in *Pteropus*. Orbits completed behind by bone (as previously recorded in *Pteropus leucopterus* alone of Chiroptera<sup>1</sup>). Sagittal crest more developed than in any *Pteropus*.

*Teeth* (Plate XXI. figs. 5, 6) remarkable for their extraordinary cuspidate character. Upper incisors with broad posterior ledges. Upper canines (fig. 7) short vertically, enormously thick antero-posteriorly, each with one stout secondary cusp halfway up its posterior edge, and two smaller postero-internal basal cusps. Premolars and molars short and broad, their anterior and posterior basal ledges so developed and their main cusps so conical as to destroy all the appearance of longitudinal grooving characteristic of the genus *Pteropus*. Lower incisors extremely disproportionate in size, the outer not less than about twenty times the bulk of the inner. Canines very short vertically, with a simple posterior basal ledge. Cheek-teeth markedly cuspidate, the general longitudinal grooving quite obliterated. Posterior premolar and first molar each with three high anterior cusps, and a low posterior basal ledge, a form of tooth strikingly similar to that called "tuberculo-sectorial" by Prof. Cope, and found in the primitive members of several of the orders of Mammalia, and, notably, in the Insectivora.

This remarkable genus is decidedly the most interesting of Mr. Woodford's Mammalian discoveries, both on account of its very striking dental characters, and especially for the fact that it seems to form an important link in the phylogeny of the Chiroptera. At first sight it might appear to be merely a highly specialized offshoot of *Pteropus*, but a careful comparison of the other members of the family has convinced me that this is not the case, and that it is more probably an isolated survivor from the time when the ancestors of the modern Pteropodidæ still possessed cuspidate teeth—such teeth, which are still characteristic of nearly all the Microchiroptera, having been inherited from the Insectivora by the Palæochiroptera<sup>2</sup>, or common ancestors of all the living Bats.

<sup>1</sup> Since the above was written, the British Museum has received, as a donation from the Genoa Museum, a specimen of *Pt. nicobaricus*, from Pulo Nias, with the orbits complete behind. Other specimens obtained at the same island, however, have their orbits incomplete, as usual, and the completed orbits of the first-named specimen are evidently due to its extreme age.

<sup>2</sup> Cf. Dobson, Mon. Asiatic Chiropt. pp. 7 to 10, and diagram (1876).



To this view I have come chiefly by finding that such rudiments of the distinguishing characteristics of *Pteralopex* as are present in other Pteropodidæ are not confined to one or two species of *Pteropus*, but are found scattered about in the different genera of the family, as though they had been independently inherited from common ancestors. Thus, while *Pteropus leucopterus*, in addition to its completed orbit, resembles *Pteralopex* in having basal ledges on the posterior sides of its incisors, and *Pteropus aneiteanus* in having its cheek-teeth so grooved transversely as well as longitudinally as to recall those of the new genus, yet *Cynopterus* has frequently bicuspid upper canines; and, above all, the nearest and most significant resemblance is presented by the otherwise very different genus *Harpyia*. There, not only do the upper canines have a distinct postero-external secondary cusp of the same relative development as that found in *Pteralopex*, but the three chief lower cheek-teeth, *i. e.* the two posterior premolars and the anterior molars, have absolutely the same primitive "tuberculo-sectorial" form as those of *Pteralopex*, the individual cusps homologizing perfectly with those of that animal. In addition, the upper cheek-teeth of *Harpyia* present something of the same primitive character; and therefore, judging merely by dentition, that genus should be looked upon as being in a still more generalized state than even *Pteralopex*.

Should this view of the origin of the dental characters of *Pteralopex* be even approximately correct, it is clear that the reputed relationship of the *Macroglossi* with the *Glossophagæ* must have no real foundation in fact, since the common ancestors of the Macro- and Microchiroptera having had cuspidate teeth, and, no doubt, insectivorous habits, these groups, whose likeness lies in their small non-cuspidate teeth and frugivorous habits, cannot be little modified descendants of the Palæochiroptera, but must be independent and comparatively recent offshoots from the two great groups to which they respectively belong.

I imagine, then, the history of the evolution of the present groups of Chiroptera to have been somewhat as follows<sup>1</sup>. The earliest Bats, or Palæochiroptera, would have been cuspidate-toothed and insectivorous like their ancestors the terrestrial Insectivora. Among them there would presently have arisen a form like *Harpyia*<sup>2</sup>, fruit-eating, but still with cuspidate teeth and no doubt markedly "tuberculo-sectorial" premolars and molars. Then, while the modern *Harpyia* would have arisen in one direction by the reduction of the incisors, in another there would have followed some form like *Pteralopex*, still retaining to a certain extent cuspidate teeth. Then the cusps would have more and more tended to disappear, the result being *Pteropus* and its allied genus, of which some few species (*e. g.* *Pteropus*

<sup>1</sup> Compare also Prof. W. Leche's learned and philosophical remarks on the phylogeny of *Galeopithecus*, an animal which, according to him, is a much modified representative of the ancestors of the Chiroptera at a time when they were, so to speak, just learning to fly. (K. Vet. Ak. Handl. xi. no. 11, 1886.)

<sup>2</sup> Of course this ancestral *Harpyia* would have had well-developed incisors above and below, as in the majority of *Pteropodidæ*.



*aneiteanus* and *leucopterus*, and *Cynopterus*) retain remnants of the ancient cuspidate structure, while others (e. g. *Pteropus coronatus*, Plate XXI. figs. 2, 3) have lost all trace of molar-cusps. Finally, as the most specialized of all would have arisen the genera with rudimentary cusplless molars, forming the group *Macroglossi*.

On the other hand, in the Insectivorous line the Palæochiroptera would have divided themselves into the Vespertilionine and Emballonurine alliances as described by Dr. Dobson<sup>1</sup>, the latter again independently giving rise in South America to a small-toothed fruit-eating group, the *Glossophagæ*, which take in that region the place occupied by the *Macroglossi* in the Old World.

5. PTERALOPEX ATRATA, Thos. (Plate XX. fig. 3, Plate XXI. figs. 4-7.)

*α, β. ♂. Aola.*

Besides the characters already mentioned, this species may be readily recognized by the deep black colour of its fur and membranes, only relieved by white mottlings on the under surface of the wing-membranes, by its thick and clumsy-looking muzzle and its short furry ears. The measurements of one of the two fine male specimens collected by Mr. Woodford are as follows:—

Head and body 240 millim. ; head 78 ; tip of nostril to eye 26 ; ear, above crown, 15 ; forearm 143 ( $\approx 5.65$  in.) ; thumb, without claw, 48 ; second finger 100 ; third finger—metacarpus 97 first phalanx 67, second phalanx 110 ; fifth finger—metacarpus 100, first phalanx 41, second phalanx 40 ; lower leg 62 ; foot 41 ; calcaneum 15 ; greatest depth of interfemoral behind knee 24.

Skull:—Basal length 62.3, greatest breadth 38.5 ; tip of nasals to supraorbital foramen 26.5 ; interorbital breadth 9.0 ; intertemporal breadth 5.7 ; palate—length 36.5, breadth between outer sides of canines 17, inside canines 9.0, outside  $\underline{p.}^4$  19.8, inside  $\underline{p.}^4$  11.0 ; basi-cranial axis 21.2, basi-facial axis 42.4.

Teeth:—Combined breadth of upper incisors 9.6 ; vertical length of canine 8.0, horizontal length 5.5 ; horizontal length of  $\underline{p.}^3$  5.1, of  $\underline{p.}^4$  5.1, of  $\underline{m.}^1$  4.5, of  $\underline{m.}^2$  3.0. Lower teeth—breadth of  $\underline{i.}^2$  3.2 ; height of canine (from basal ledge behind) 4.6 ; horizontal length of anterior premolar 3.0, of  $\underline{p.}^3$  4.5, of  $\underline{p.}^4$  4.6, of  $\underline{m.}^1$  4.1, of  $\underline{m.}^2$  3.6, of  $\underline{m.}^3$  2.8.

The second specimen is slightly larger than the type, having a forearm 146 millim. in length.

It is unfortunate that Mr. Woodford is unable to give any information about the habits and food of this interesting Bat, as both specimens were brought to him dead by his native collectors. The semi-fluid contents of the stomach and intestines, however, do not appear on a microscopic examination to be essentially different from those of *Pteropus woodfordi*.

6. CYNONYCTERIS BRACHYOTIS, Dobs.

No further specimens obtained. See previous paper, p. 323.

<sup>1</sup> *L. c.*

## 7. HARPYIA MAJOR, Dobs.

a. ♀. Aola.

Forearm 80 millim.

## 8. CEPHALOTES PERONII, Geoff.

a, b. ♂ and separate head. Rubiana, New Georgia.

Forearm 103 millim.

## 9. MACROGLOSSUS AUSTRALIS, Peters.

*Macroglossus minimus*, var. *australis*, Peters, MB. Ak. Berl. 1867, p. 13 (footnote).

*Macroglossu australis*, id. t. c. p. 871.

a, b. ♂ ♀. Aola.

Forearms 38 and 39 millim respectively.

This form appears to be undoubtedly distinct from *M. minimus*, although Dr. Dobson has only recognized a single species of the genus in his Catalogue. It was distinguished by Dr. Peters merely on account of its smaller size, and neither he nor Dr. Dobson appear to have observed that<sup>1</sup> its rhinarium is deeply and distinctly grooved to the upper lip, in marked contrast to the typical species, in which the slight groove between the nostrils does not pass down to the upper lip. The whole face also in *M. australis* is decidedly shorter than in *M. minimus*, and the forward projection of the upper lip with the corresponding prominence of the premaxillary bones of the skull, so characteristic of the latter, is much reduced in the former. The difference in size is also considerable, the forearm in the ten specimens of the southern species before me ranging from 38 to 43 millim., while in five Javan individuals it varies from 45 to 48 millim.

As to the respective ranges of the two forms I have no material to enable me to determine which of them inhabits the Malay Peninsula; but *M. australis* certainly extends as far westward as the Philippines, whence the Museum possesses several specimens collected by Mr. Hugh Cuming and Mr. Alfred Everett. A skin obtained by Mr. Wallace in Mysol and several examples found by the Rev. G. Brown in the Duke of York Group also belong to *M. australis*.

## 10. NESONYCTERIS WOODFORDI, Thos.

*Nesonycteris woodfordi*, Thos. P. Z. S. 1887, p. 324, pl. xxvi.

a. Ad. ♂. Aola.

The specimens of this beautiful and interesting species previously obtained having been dried skins, it may be useful to give the full dimensions of the present individual, which is properly preserved in spirit.

Head and body 95 millim.; head 34; ear, above crown, 10; forearm 53; thumb, without claw, 18·5; second finger 39; third finger—metacarpus 41, first phalanx 29, second phalanx 42; lower leg 23·7; foot 17; calcaneum 4·3; depth of interfemoral membrane behind knee 5.

<sup>1</sup> As was pointed out to me by Mr. Blanford.

## ANTHOPS, Thos.

*Anthops*, Thos. *t. c.* p. 156 (1888).

Like *Hipposiderus*, but with the tail rudimentary, consisting merely of three or four vertebræ hidden in the base of the inter-femoral membrane and not reaching halfway towards its posterior margin. Nose-leaf (Plate XXII. fig. 1) very complicated, its upright transverse portion emarginate above, the projections, however, not thickened and pointed as in *Asellia*, but rounded and hollowed out behind and their substance quite thin. Premolars  $\frac{2}{2}$ .

11. ANTHOPS ORNATUS, Thos. *l. c.* (Plate XXII. fig. 1.)

*a-f.* ♂ ♀. Aola.

Posterior nose-leaf tridentate, the projections each forming a little spherical cup, opening backwards; front surface of the leaf divided into four compartments by three very distinct vertical ridges, each running up to the lower side of one of the cups above. Sella with a blunt projecting central point. Horizontal horseshoe-leaf narrow, not emarginate anteriorly; sides of the muzzle with two secondary leaves, the upper very short, the lower long, extending backwards to join the outer corners of the posterior erect leaf. Centre of upper lip notched below. Supraorbital projection distinct. Frontal gland transverse, very small and almost rudimentary; a peculiar fleshy point, about 2 millim. long, projecting upwards from its centre. Ears large, laid forward they reach quite to the end of the muzzle, their inner edge evenly convex, their tip sharply pointed, their outer edge slightly concave above, strongly convex below. Limbs and membranes naked. Wings from the ankles.

Fur long, soft, and silky. Colour, so far as can be judged from specimens in spirit, greyish buff, the bases of the hairs slaty grey, their terminal halves buff, their extreme tips brown.

Dimensions of a pair, male and female, of which the female was the one originally selected as the type:—

	♂.	♀.
Head and body . . . . .	53	51
Head . . . . .	22	21
Muzzle to eye . . . . .	7	6·8
Ear, above crown . . . . .	16·5	17
Forearm . . . . .	50	51
Index-finger . . . . .	41	40
Third finger, metacarpus . . . . .	37	37
"    "    1st phalanx . . . . .	18	18
"    "    2nd phalanx . . . . .	19	18
Lower leg . . . . .	23	22·5
Foot . . . . .	9·3	9·5
Calcaenum . . . . .	9·0	8·0
Interfemoral membrane, depth in centre . . . . .	20	20

The forearms of the other four specimens are 48·0, 48·5, 49·0, and 49·4 millim. respectively.

Skull (♂):—Basal length 15·1, greatest length 19·7; greatest

breadth 9·8; intertemporal constriction, breadth 2·0; front of upper canine to back of m.<sup>3</sup> 6·8.

This Bat is evidently more nearly allied to *Hipposiderus* than to either *Tricenops*, *Rhinonycteris*, or *Cælops*, although the last-named is the only one of the subfamily that agrees with it in the rudimentary state of the tail. To no particular member or group of *Hipposiderus*, however, does it show any special affinity, since its agreement with *Asellia* in the emarginate state of the posterior nose-leaf is probably no evidence of genetic relationship, the differences between it and that subgenus in the essential structure of the nose-leaf and in the reduction of the tail being quite as marked as in the case of the other members of the genus *Hipposiderus*.

The presence of a peculiar insectivorous Bat in Guadalcanar is a most interesting and unexpected fact, since, as a general rule, oceanic islands are characterized by the large proportion and great speciality of their frugivorous as compared with their insectivorous Bats, a general rule otherwise well exemplified in the Solomon Islands, as shown below in the table, p. 483.

12. *HIPPOSIDERUS TRICUSPIDATUS*, Temm.

*a, b.* ♂ ♀. Aola. [10.]

Forearms 37 and 40 millim. respectively.

13. *HIPPOSIDERUS DIADEMA*, Geoffr.

*a, b.* ♀. Aola.

*c.* ♂. Rubiana.

These specimens differ in size to a remarkable extent, the forearm in both *a* and *b* being 79 millim. long, while in *c* it is no less than 96. Other specimens in the Museum collection, however, connect these two extremes, and show that the difference in size cannot be looked upon as a specific character. Thus a Cinghalese female has a forearm 94 millim. long; several specimens have them about 86 or 88; a male from the Philippines one 82 long, while a female from the same locality has one only 76, this latter being the least observed in adult animals.

14. *HIPPOSIDERUS CERVINUS*, Gould.

♀. Aola. [5.]

Forearm 44 millim.

15. *VESPERUGO ABRAMUS*, Temm.

*a.* ♀. Aola. [11.]

Forearm 33 millim.

16. *MINIOPTERUS SCHREIBERSI*, Kuhl.

*a, b.* ♂ ♀. Aola.

These specimens belong to one of the small races of this widely-spread species, their forearms measuring only between 40 and 41 millim., exactly as in the forms called "*M. schreibersi*, var. *pusillus*," and "*M. australis*" by Dobson<sup>1</sup>. Their characters are on the whole

<sup>1</sup> Cat. Chir. B. M. p. 351 (1878).



confirmatory of Prof. Leche's opinion<sup>1</sup> that the specific distinction of the latter is very doubtful, since they combine the small size and the southern habitat of *M. australis* with the nearly naked inter-femoral membrane of the true *M. schreibersi*.

17. *EMBALLONURA NIGRESCENS*, Gr.

♂. Aola. [35.]

Forearm 35 millim.

Judging by the large number of specimens contained in each of Mr. Woodford's and in Dr. Guppy's collections, this is evidently the commonest insectivorous Bat of the Solomons.

RODENTIA.

18. *MUS IMPERATOR*, Thos. (Plate XXII. figs. 2, 3.)

*Mus imperator*, Thos. *t. c.* p. 157 (1888).

a, b. ♂ ♀. Aola.

Size very large, exceeding that of any other true *Mus*. Fur rather short and woolly. General colour uniform grizzled ashy grey above, dirty white below: the longer hairs of the back black, the shorter softer hairs grey, with shining ashy tips; no elongated piles on the posterior back; whiskers very long, from three to four inches in length. Ears thick, short, and rounded; laid forward they do not nearly reach to the eye, falling short of the posterior canthus by about one third of an inch. Mammæ 4 only, all inguinal. Feet (Plate XXII. fig. 3) broad and stout; palms and soles naked, the pads large, but far smaller than in the next species; posterior pad elongate. Fifth hind toe, without claw, reaching just to the end of the first phalanx of the fourth. Tail decidedly shorter than the head and body, naked, scaly, the scales averaging from 9 to 11 to the centimetre, unusually smooth and little prominent; tip of tail almost scaleless.

Skull (Plate XXII. fig. 2) stout and heavily built. Frontal processes of premaxillæ projecting backwards some way beyond the posterior edge of the nasals. Interorbital space flat, parallel-sided, its edges square but not beaded or ridged. Interparietal proportionally small. Outer plate of infraorbital foramen but little developed, its anterior edge convex forwards above, slightly concave below. Palatal foramina short, their posterior end about 5 millim. in front of the level of m.<sup>1</sup> Bullæ small and low, scarcely inflated.

Incisors very deep antero-posteriorly, narrow transversely, their enamel deep orange above, dull pale yellow below; the lower pair each with a very indistinct shallow groove down its anterior surface. Pattern of molars as usual.

Dimensions (in spirit):—

	Head and Tail.	Hind foot.	Ear.	Forearm	Heel to front	Last	
	body.			and hand.	of last	foot-pad,	
					foot-pad,	length.	
♂ . . . . .	350	258	66	19	83	35	13
♀ ( <i>type</i> )	340	250	64	20	83	34	12.5

Skull (♀):—Basal length 60 millim., greatest breadth 35; nasals,

<sup>1</sup> P. Z. S. 1884, p. 53.

length 24, greatest breadth 8·2; interorbital breadth 11·1; interparietal, length 6·8, breadth 12·5; depth of anterior zygoma-root 7·8; palate, length 36·3, breadth outside m.<sup>1</sup> 13·1, inside m.<sup>1</sup> 5·6; length of palatal foramina 7·0; length of upper molar series 12·0.

The most remarkable thing about this Rat is its gigantic size, there being only two Rodents at all allied to it, viz. *Nesokia bandicota* and *Cricetomys gambianus*, which equal it in this respect. Its relations to its only really close ally, *Mus rex*, are noted below.

Its habits, according to Mr. Woodford, are entirely terrestrial.

19. *MUS REX*, Thos. (Plate XXII. figs. 4, 5.)

*Mus rex*, Thos. *l. c.*

*a-d.* 2 ♂ and 2 ♀. [7.]

Size very large, although markedly less than in the last species. Colour, character of fur, lengths of ears, proportions of toes, and number of mammæ all quite as in that species. Sole-pads (Plate XXII. fig. 5), however, much larger and broader, less sharply defined. Tail exceedingly long, longer than the head and body combined, naked, scaly, the scales not overlapping, but forming prominent projections, which give to the whole tail an extraordinary roughened rasp-like character, most marked, however, on the underside, and gradually fading off towards the tip. These projecting scales are arranged in rings, which average from 7 to 9 to the centimetre. The base of the tail is hairy like the body for about one inch.

Skull (Plate XXII. fig. 4) strong and stout, the zygomata proportionally more expanded than in *M. imperator*. Tips of nasals not projecting in front beyond the level of the front of the incisors. Frontal processes of premaxillæ scarcely extending backwards beyond the nasals. Supraorbital edges square and sharp, not beaded. Interparietal bone absolutely, as well as relatively, larger than in *M. imperator*. Outer plate of anterior zygoma-root markedly projecting forwards. Palatal foramina and bullæ as in the last species.

Teeth as in *Mus imperator*, but the last upper molar rather larger in proportion.

Dimensions (in spirit):—

	Head and body.	Tail.	Hind foot.	Ear.	Forearm and hand.	Heel to front of last foot-pad.	Last foot-pad, length.
♂ ( <i>type</i> )	290	296	55	18	76	30·2	16·3
♂ . . . . .	280	300	57	16	76	30·5	16·5
♀ . . . . .	270	285	54	16	73	29·5	15
♀ . . . . .	255	277	54	14	73	30	16

Skull (♂):—Basal length 54 millim.; greatest breadth 33; nasals, length 20, greatest breadth 6·8; interorbital breadth 9; interparietal, length 7·0, breadth 13·2; depth of anterior zygoma-root 7·0; palate, length 33, breadth outside m.<sup>1</sup> 11·3, inside m.<sup>1</sup> 5·0; length of palatal foramen 6·8; length of upper molar-series 11·1.

Habits entirely arboreal (*vide* Woodford).

I am quite unable to say to which of the known species of *Mus* these two large Rats are most nearly allied. While clearly differing from

each other specifically, they have a great many characters in common, as for example their considerable size, the general forms of their skulls and teeth, and, notably, their very unusual mammary formula,  $0-2=4$ , a formula only found, so far as I know, in two other members of the genus, namely *Mus trivirgatus*, Temm., and *M. delicatulus*, Gould, both quite small species, and the latter nearly, if not quite, the most diminutive member of the genus.

It is, however, in their relation to each other that their chief interest lies, for they seem to be clearly the slightly modified descendants of one single species that, once introduced, has been isolated in Guadalcanar for some considerable time, while it has apparently died out elsewhere. Of this original species some individuals would have adopted a terrestrial, and others an arboreal life, and their respective descendants would have been modified accordingly. In this way I would explain the fact that at the present time we have in Guadalcanar two genuine species, agreeing with each other in their essential structure, and yet separated by a considerable number of characters all having a more or less direct relation to a climbing or non-climbing habit of life. Of these, of course by far the most striking are the broad foot-pads and the long, rasp-like, probably semi-prehensile tail of *Mus rex*, as compared to the smaller pads and short smooth tail of *Mus imperator*.

#### 20. *MUS SALAMONIS*, Rams.

*Mus salamonis*, Rams. P. Linn. Soc. N. S. W. vii. p. 43 (1882).

I know nothing more of this species than is contained in the original description. Its hind foot is stated to be 44 millim. in length, and its locality is Florida Island. The length of its hind foot, curiously enough, exactly fills in the gap between that of *M. rex* and of the next species, so that the four Solomon Island Rats have the lengths of their hind feet just in the progressive series 34, 44, 54, and 64 millim.

#### 21. *MUS PRÆTOR*, Thos. (Plate XXII. fig. 6.)

*Mus prætor*, Thos. t. c. p. 158.

a, b. ♂ ♀. Aola.

Size about that of *Mus rattus*. Fur short, mixed with numerous spines, and with a few much longer piles on the posterior back. General colour coarsely grizzled grey, the longer piles and the spines black-tipped, the ordinary fur with yellow tips; the bases of all pale slaty grey. Underside dirty white, in old specimens yellow; the hairs all grey at base. Ears rounded, rather short, laid forward they just reach to the posterior canthus of the eye. Mammæ 2—2=8. Hands and feet greyish white, a darker patch on the terminal part of the metatarsus. Hind feet (Plate XXII. fig. 6) rather short in proportion to the size of the animal; fifth toe reaching to the middle of the first phalanx of the fourth; soles naked, the pads rounded, rather small. Tail short, not so long as the body without the head, thinly haired and coarsely scaled, the rings of scales averaging about 10 to the centimetre; its colour wholly deep black.

Supraorbital edges of skull finely ridged, the ridges prolonged backwards to the outer corners of the interparietal. Outer plate of anterior zygoma-root well developed, projecting forwards. Palatine foramina long, rather longer than the molar series, ending behind just on a level with the front of m.<sup>1</sup> Bullæ low and small, comparatively rough and opaque.

Teeth as usual; molars rather broad and rounded.

Dimensions:—

	Head and body.	Tail.	Hind foot.	Ear.	Forearm and hand.	Heel to front of last foot-pad.	Last foot-pad, length.
♂ . . . . .	188	134	35.5	15.5	47	19.0	6
♀ ( <i>type</i> )	168	118	33.5	15.0	43	17.5	5

Of this species, in addition to the pair brought by Mr. Woodford from Guadalcanar, there is a skin in the Museum from Kabahadai, New Britain, collected by the Rev. G. Brown, and agreeing with Mr. Woodford's specimens in every respect.

*Mus prator* has a strong superficial resemblance to *M. terræ reginæ*, Alst.<sup>1</sup>, from which, however, it may be readily distinguished by its shorter ears, shorter and darker-coloured feet, much shorter and wholly black tail, and, especially, by its possession of two pairs of pectoral mammæ instead of only one.

## MARSUPIALIA.

### 22. PHALANGER ORIENTALIS BREVICEPS, THOS.

*Phalanger orientalis breviceps*, Thos. Cat. Mars. B. M. p. 204 (1888).

*a, b.* Skins, Aola. *c.* In spirit, Rubiana, New Georgia.

As I have elsewhere (*l. c.*) pointed out, the Solomon Island Cuscus proves, in common with the Duke of York form, to be referable to a distinct subspecies of the ordinary Papuan Grey Cuscus, distinguishable by its smaller size, and, especially, by its much smaller last premolar (*p.*<sup>1</sup>). Of the three specimens obtained, two (*b* and *c*) belong to a much darker-coloured race, believed by Mr. Woodford to be a distinct species, but they appear to me to be quite inseparable from the greyer form.

Concerning this animal, Mr. Woodford writes to me as follows:—  
“At Alu, Shortland Island, only the grey variety is found, and the same at Fauro, but the natives told me of a dark-coloured Cuscus being found on Bougainville. I first met with the dark variety at Rubiana, where one specimen was brought off to the ship with some others of the grey variety. I again met with it in Guadalcanar during one of my expeditious up the Kobua River, where we caught one, which the natives ate. They assured me it was not uncommon at Aola, and by offering a good price I secured five alive, and three of the grey variety, all of which I took away with me to bring to Sydney, and if possible, home. I never met with anything

<sup>1</sup> P. Z. S. 1879, p. 646 (= *Acanthomys leucopus*, Gray, P. Z. S. 1867, p. 598).



intermediate in colour between the grey and brown varieties. The grey is far the commoner of the two.”

Cuscuses seem to be common on all the islands of both the Duke of York and Solomon groups, and extend in the latter to San Christoval, whence several specimens were sent to the British Museum by Dr. F. M. Rayner, and Mr. W. Macgillivray, of H.M.S. ‘Herald,’ who visited that island in December 1854.

The following table gives a complete list with localities so far as is known of all the land mammals of the Solomon Islands, and may be usefully compared with that given previously (P. Z. S. 1887, p. 327) in connection with the further range of these mammals into the Duke of York group of islands. The names of those peculiar to the group are printed in heavy type.

	Shortland and Fautro Islands.	New Georgia.	Guadalcanar.	San Christoval.	Remarks, or other localities.
<b>CHIROPTERA.</b>					
<b>MEGACHIROPTERA.</b>					
1. <b>Pteropus grandis</b> .....	*	*			
2. — <b>hypomelanus</b> .....	*				
3. — <b>rayneri</b> .....	...	...	*	*	
4. — <b>woodfordi</b> .....	...	...	*	*	
5. <b>Pteralopex atrata</b> .....	...	...	*		[Celebes.
6. <i>Cynonycteris brachyotis</i> .....	*	...	...	...	Duke of York and
7. <i>Harpyia major</i> ..	*	*	*		Ugi.
8. <i>Cephalotes peronii</i> .....	*	*	...	*	
9. <i>Macroglossus australis</i> .....	...	...	*		
10. <b>Nesonycteris woodfordi</b>	*	...	*		
<b>MICROCHIROPTERA.</b>					
11. <b>Anthops ornatus</b> .....	...	...	*		
12. <i>Hipposiderus tricuspidatus</i> ...	...	...	*		
13. — <b>diadema</b> .....	*	*	*		
14. — <b>cervinus</b> .....	*	...	*		
15. <i>Vesperugo abramus</i> .....	*	...	*		
16. <i>Miniopterus schreibersi</i> .....	...	...	*		
17. <i>Emballonura nigrescens</i> .....	*	...	*	...	Ugi.
<b>RODENTIA.</b>					
18. <b>Mus imperator</b> .....	...	...	*		
19. — <b>rex</b> .....	...	...	*		
20. — <b>salamonis</b> .....	...	...	...	...	Florida Island.
21. — <b>prætor</b> .....	...	...	*	...	Also Duke of York.
<b>MARSUPIALIA.</b>					
22. <i>Phalanger orientalis breviceps</i>	*	*	*	*	Duke of York group.

For the sake of comparison it may also be useful to give a revised list of the Mammals as yet known from the Duke of York group, by way of which the Solomon Islands must have at one time or another received all their mammalian immigrants.

The species are :—

CHIROPTERA.

1. *Pteropus melanopogon*, Schleg.
2. — *hypomelanus* \*, Temm.
3. — **coronatus**, Thos.
4. — **capistratus**, Peters.
5. *Cynonycteris brachyotis*, Dobs.
6. *Harpyia major*, Dobs.
7. *Cephalotes peronii*, Geoff.
8. *Macroglossus australis*, Peters.
9. **Melonycteris melanops**, Dobs.
10. *Hipposiderus diadema* \*, Geoff.
11. — *tricuspidatus*, Temm.
12. — *cervinus*, Gould.
13. *Vesperugo abramus* \*, Temm.
14. — **angulatus**, Peters.

15. *Kerivoula hardwickei*, Gr.
16. *Miniopterus schreibersi* \*, Natt.
17. *Emballonura nigrescens*, Gr.

RODENTIA.

18. *Mus prætor*, Thos.
19. — *browni*, Alst.
20. *Uromys cerviniipes*, Gould.

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21. *Macropus browni*, Rams.
22. *Petaurus breviceps papuanus*, Thos.
23. *Phalanger orientalis breviceps*, Thos.
24. **Perameles cockerelli**, Rams.

Of the 22 Mammals inhabiting the Solomon Islands there are therefore no less than 9 peculiar species, while in the Duke of York group, with a total of 24, there are only five. Twelve are common to both groups, of which two only, *Mus prætor* and *Phalanger orientalis breviceps*, are peculiar to the two groups combined.

EXPLANATION OF THE PLATES.

PLATE XX.

- Fig. 1. Head of *Pteropus woodfordi*, p. 472.  
 2. Head of *Pteropus coronatus*, p. 471.  
 3. Head of *Pteralopex atrata*, p. 475.

PLATE XXI.

- Fig. 1. Skull of *Pteropus woodfordi*, p. 472.  
 2, 3. Upper and lower teeth of *Pteropus coronatus*, p. 471.  
 4. Skull of *Pteralopex atrata*, p. 475.  
 5, 6. Upper and lower teeth of do.  
 7. Canine of do., inner aspect.

PLATE XXII.

- Fig. 1. Nose-leaf of *Anthops ornatus* ( $\times 4$ ), p. 477.  
 2, 3. Skull and hind foot of *Mus imperator*, p. 479.  
 4, 5. Skull and hind foot of *Mus rex*, p. 480.  
 6. Hind foot of *Mus prætor*, p. 481.

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\* These four species have not as yet been actually recorded from the group, but as they occur in the islands on both sides of it, their presence there is assumed.